

Claims

1. A device comprising an n-channel semiconducting film, wherein the film comprises a perylene tetracarboxylic acid diimide compound and wherein the film exhibits a field effect electron mobility greater than $0.01 \text{ cm}^2/\text{Vs}$.
2. A process for fabricating a device, comprising the step of depositing onto a substrate an n-channel semiconducting film that comprises a perylene tetracarboxylic acid diimide compound, such that the film exhibits a field effect electron mobility greater than $0.01 \text{ cm}^2/\text{Vs}$ in a bottom contact configuration without treatment of the source and drain electrodes prior to deposition of the semiconducting film.
3. The device of claim 1, wherein the device comprises a thin film transistor that comprises the n-channel semiconducting film.
4. The device of claim 3, wherein the n-channel semiconducting film exhibits an on/off ratio of at least 10000, or at least 100000.
5. The device of claim 1, or the process of claim 2, wherein the compound comprises a perylene 3,4,9,10 tetracarboxylic acid diimide structure wherein substituents attached to the imide nitrogens comprise linear or branched alkyl chains or electron deficient alkyl or benzyl groups, or the substituents comprise chains having a length of four to eighteen atoms, or having a length of eight atoms.
6. The device or process of claim 5, wherein the compound is selected from a perylene 3,4,9,10 tetracarboxylic acid diimide, and heterocyclic variations of the 3,4,9,10-perylene tetracarboxylic acid diimide or the compound is selected from a N,N'-dialkyl

perylene-3,4,9,10-teracarboxylic acid diimide in which alkyl chain length varies from four to eighteen carbons, or N,N'-di(n-octyl) perylene-3,4,9,10-teracarboxylic acid diimide.

7. The process of claim 2, wherein the compound is deposited by sublimation, and wherein the substrate temperature is no more than 100 °C during the deposition.

8. A device comprising an n-channel semiconducting film, wherein the film exhibits a field effect electron mobility greater than 0.01 cm²/Vs, and the on/off ratio is >100000 in bottom contact configuration in the absence of an underlayer (i.e. thiol).